Algebra 2 CP 10th & 11th grade NAME: KEY
Final Review Sheet

1.) Solve the quadratic: $\frac{4x^2}{4} = \frac{80}{4}$.

$\sqrt{x^2} = \sqrt{20}$ $\boxed{x = \pm 2\sqrt{5}}$

2.) Solve the quadratic: $x^2 - 7x - 18 = 0$

$(x-9)(x+2) = 0$ $x-9=0$ $x+2=0$

$\boxed{x=9 \quad x=-2}$

3.) Solve the quadratic: $3x^2 + 2x = 21$

-63

$3x^2+2x-21=0$

$3x^2+9x-7x-21=0$

$3x(x+3)-7(x+3)=0$

$(3x-7)(x+3)=0$

$3x-7=0$ $\boxed{x=7/3}$

$x+3=0$ $\boxed{x=-3}$

4.) Solve using the quadratic formula: $4x^2 + 3x - 8 = 0$

$a=4$ $b=3$ $c=-8$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $x = \frac{-3 \pm \sqrt{(3)^2-4(4)(-8)}}{2(4)}$ $x = \frac{-3 \pm \sqrt{9+128}}{8} = \boxed{\frac{-3 \pm \sqrt{137}}{8}}$

5.) Solve using the quadratic formula: $x^2 - 3x - 1 = 0$

$a=1$ $b=-3$ $c=-1$

$x = \frac{3 \pm \sqrt{(-3)^2-4(1)(-1)}}{2(1)} = \frac{3 \pm \sqrt{9+4}}{2} = \boxed{\frac{3 \pm \sqrt{13}}{2}}$

6.) Find the value that completes the square: $x^2 - 12x + \underline{36}$.

↑ half of middle term squared

7.) Solve by completing the square: $x^2 - 6x + 3 = 0$

$x^2-6x+\_\_ = -3$

$x^2-6x+9 = -3+9$

$x^2-6x+9 = 6$

$\sqrt{(x-3)^2} = \sqrt{6}$

$x-3 = \pm\sqrt{6}$

$\boxed{x = 3 \pm \sqrt{6}}$

8.) Find the discriminant of $2x^2 - 11x + 6 = 0$.

b^2-4ac

$a=2$ $c=6$

$b=-11$

$(-11)^2-4(2)(6)$

$121-48 = \boxed{73}$

9.) Find the number and type of solutions of $3x^2 - 5x + 4 = 0$.

$a=3$ $b=-5$ $c=4$

b^2-4ac

$(-5)^2-4(3)(4)$

$25-48 = -23$

$\boxed{\text{2 nonreal solutions}}$

10.) Which direction does the graph of $f(x) = 5x^2 + 3x - 8$ open?

positive

opens up

11.) Find the axis of symmetry of $f(x) = x^2 - 6x + 9$.

$X = \frac{-b}{2a} \rightarrow \frac{6}{2} = 3$ $\boxed{X=3}$

12.) Find the vertex of $f(x) = x^2 - 6x + 9$.

$X=3$ $(3)^2 - 6(3) + 9$

$9 - 18 + 9 = 0$ $\boxed{(3,0)}$

13.) If given quadratic functions how do you determine which graph will be the narrowest?

The quadratic with the greatest $|a|$ will be the narrowest.

14.) How do you determine if a quadratic will have a vertex that is a minimum or a maximum?

opens up → minimum ($a>0$)

opens down → maximum ($a<0$)

15.) Find the y-intercept of $f(x) = 5x^2 + 2x - 11$.

$5(0)^2 + 2(0) - 11$

$0 + 0 - 11 =$ $\boxed{-11}$ $\boxed{(0,-11)}$

16.) Find the vertex of the following quadratic equation: $y = x^2 - 8x + 48$

$X = \frac{-b}{2a} = \frac{8}{2} = 4$ $Y = (4)^2 - 8(4) + 48$

$16 - 32 + 48 = 32$ $\boxed{(4,32)}$

17.) Find the x intercepts of the following quadratic equation: $y = x^2 + 8x + 15$

$0 = (X+5)(X+3)$ $X+5=0$ $X+3=0$

$\boxed{X=-5 \quad X=-3}$

18.) Simplify: $\frac{x^2 - 25}{x - 5}$

$\frac{(X+5)(X-5)}{(X-5)} = \boxed{X+5}$

19.) Simplify: $\frac{x^2+x-90}{x^2+14x+40}$

$\frac{(x+10)(x-9)}{(x+10)(x+4)} = \boxed{\frac{x-9}{x+4}}$

20.) Multiply: $\frac{5x^3}{3y^2} \bullet \frac{9y}{10x}$

$\frac{45x^3y}{30y^2x} = \boxed{\frac{3x^2}{2y}}$

21.) Multiply: $\frac{x^2-4x-5}{x^2-3x+2} \bullet \frac{x^2-4}{x^2-3x-10}$

$\frac{(x-5)(x+1)}{(x-2)(x-1)} \cdot \frac{(x+2)(x-2)}{(x-5)(x+2)} = \boxed{\frac{x+1}{x-1}}$

22.) Divide: $\frac{1}{x+3} \div \frac{x^2}{x^2-2x-15}$

$\frac{1}{(x+3)} \cdot \frac{(x-5)(x+3)}{x^2} = \boxed{\frac{x-5}{x^2}}$

23.) Simplify: $\frac{\frac{6}{y}}{\frac{11}{x}}$

$\frac{6}{y} \cdot \frac{x}{11} = \boxed{\frac{6x}{11y}}$

24.) Simplify: $\frac{\frac{-3}{2}}{\frac{y}{}+x}$ $\frac{-3}{\frac{2+xy}{y}}$

$\frac{-3}{1} \cdot \frac{y}{2+xy} = \boxed{\frac{-3y}{2+xy}}$

25.) Solve: $\frac{6}{x-4} = \frac{2}{x-4}$ and state any restrictions

$6 \neq 2$

NO solution $x \neq 4$

26.) Solve: $\frac{1}{3x}+\frac{1}{8}=\frac{4}{3x}$, and state any restrictions

$\frac{8}{24x}+\frac{3x}{24x}=\frac{32}{24x}$ $8+3x=32$ $3x=24$ $\boxed{x=8}$ $x\neq 0$

27.) Solve: $\sqrt{2x-3}-9=0$

$(\sqrt{2x-3})^2=(9)^2$ $2x-3=81$ $2x=84$ $\boxed{x=42}$

28.) Solve: $(\sqrt{5+2x})^2=(3)^2$

$5+2x=9$ $2x=4$ $\boxed{x=2}$

29.) Solve: $\sqrt{6x-1}-\sqrt{7x+8}=0$

$(\sqrt{6x-1})^2=(\sqrt{7x+8})^2$

$6x-1=7x+8$

$\boxed{-9=x}$

30.) Solve: $(\sqrt[3]{7x+3})^3=(\sqrt[3]{1+6x})^3$

$7x+3=1+6x$

$\boxed{x=-2}$

31.) What is 'k' referred to as in the equation: $y = kx$

constant of variation

32.) What type of variation is represented by the following equation? $y=\frac{k}{x}$

Inverse variation

33.) What type of variation is represented by the following equation? $y=kxz$

Joint variation

34.) What type of variation is represented by the following equation? $y = kx$

direct variation

35.) Find the constant of variation, k, if y varies directly as x and x = 3 and y = -6.

$y = kx$ $\quad -6 = k(3)$ $\quad \boxed{k = -2}$

36.) Find the constant of variation, k, if y varies jointly as x and z and x = -3, y = 21 and z = -1.

$y = kxz$ $\quad 21 = k(-3)(-1)$

$\boxed{k = 7}$

37.) Find the constant of variation, k, if y varies inversely as x and y= -5 when x = 4.

$y = \frac{k}{x}$ $\quad -5 = \frac{k}{4}$ $\quad \boxed{k = -20}$

38.) Multiply $(x + 3)(2x^2 - 5x + 7)$

$2x^3 - 5x^2 + 7x + 6x^2 - 15x + 21$

$\boxed{2x^3 + x^2 - 8x + 21}$

39.) Multiply: $(x - y^2)(x + y^2)$

$\boxed{x^2 - y^4}$ $\quad x^2 + xy^2 - xy^2 - y^4$

40.) Multiply: $(9x + 2)(9x - 2)$

$\boxed{81x^2 - 4}$ $\quad 81x^2 - 18x + 18x - 4$

41.) Multiply: $(5x - 3)^2$ $\quad (5x-3)(5x-3)$

$\boxed{25x^2 - 30x + 9}$ $\quad 25x^2 - 15x - 15x + 9$

42.) Multiply: $(8x + 1)(x - 4)$

$8x^2 - 32x + x - 4$

$\boxed{8x^2 - 31x - 4}$

43.) Multiply: $(2x + 5)(x^2 - 6x - 3)$

$2x^3 - 12x^2 - 6x + 5x^2 - 30x - 15$

$\boxed{2x^3 - 7x^2 - 36x - 15}$

44.) Subtract: $(4x^3 - 17x^2 + 2x + 7) + (x^3 + 25x^2 + 20)$

$\boxed{3x^3 + 8x^2 + 2x + 27}$

45.) Add: $(10xy - 6x^2y + 3xy^2 - 13) + (-5xy^2 + 11x^2y - 12xy + 21)$

$-2xy^2 + 5x^2y - 2xy + 8$

46.) Add: $-5x + 6y - 11 + 8x - 3y - 2x + 16 - y$

$x + 2y + 5$

47.) Find the remainder when $x^3 - 7x^2 + 15x - 9$ is divided by $x + 1$?

$(-1)^3 - 7(-1)^2 + 15(-1) - 9$

$-1 - 7 - 15 - 9 = -32$

48.) Divide: $-4x^3 + 5x^2 + 6$ by $x - 1$

$-4x^2 + x + 1 + 7/(x-1)$

49.) Divide: $3x^4 - 51x^2 + 7x + 10$ by $x - 4$

$3x^3 + 12x^2 - 3x - 5 - 10/(x-4)$

50.) Divide using synthetic division: $(3x^3 + 2x^2 + x - 8) \div (x - 5)$

$3x^2 + 17x + 86 + 422/(x-5)$

51.) Make a list of all the possible rational zeros of the polynomial function:
$f(x) = 3x^3 + 5x^2 - 6x + 2$

last → $p: \pm 1, \pm 2$ 1st → $q: \pm 1, \pm 3$ $\frac{p}{q} = \frac{\pm 1}{\pm 1}, \frac{\pm 2}{\pm 1}, \frac{\pm 1}{\pm 3}, \frac{\pm 2}{\pm 3} \rightarrow \pm 1, \pm 2, \pm\frac{1}{3}, \pm\frac{2}{3}$

52.) List the possible rational zeros of the function $f(x) = x^3 - 2x - 16$

$p: \pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

$q: \pm 1$

$\frac{p}{q} = \pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

53.) What are the factors of: $x^3 - x^2 - 5x - 3$?

$\frac{p}{q}: \pm 1, \pm 2, \pm 3$

3 | 1 −1 −5 −3
↓ 3 6 3
1 2 1 0

$x^2 + 2x + 1$

$(x+1)(x+1)(x-3)$

↑ factors

54.) Factor the polynomial completely: $x^3 - 7x^2 + 15x - 9$.

$\frac{P}{q}: \pm 1, \pm 3, \pm 9$

1 | 1 −7 15 −9
↓ 1 −6 9
1 −6 9 0

$x^2 - 6x + 9$

$(x-3)^2(x-1)$

55.) Factor the polynomial completely. $x^3 - 2x^2 - 48x$

$x(x^2 - 2x - 48)$

$x(x-8)(x+6)$

56.) Find the zeros of the polynomial function: ~~$f(x) = 3x^3 + 5x^2 - 6x + 2$~~

$\frac{P}{q}: \pm 1, \pm 2, \pm 7, \pm 14$

1 | 1 8 5 −14
↓ 1 9 14
1 9 14 0

$x^2 + 9x + 14$

$x^3 + 8x^2 + 5x - 14$

$(x+7)(x+2)(x-1) = 0$

$x = -7, -2, 1$

57.) Find the zeros of the polynomial function: $f(x) = x^3 - 25x$

$x(x^2 - 25) \rightarrow x(x+5)(x-5)$

$x = 0$
$x = -5$
$x = 5$

58.) Find all real zeros of the function: ~~$y = x^4 + 3x^3 - 8x^2 - 4x$~~

$\frac{P}{q}: \pm 1, \pm 2, \pm 4$

$x(x^3 + 3x^2 - 6x - 8)$

2 | 1 3 −6 −8
↓ 2 10 8
1 5 4 0

$x^2 + 5x + 4$

$x(x+4)(x+1)(x-2) = 0$

$x = -4, -1, 2, 0$

59) Describe the end behavior of the function $f(x) = x^2 + 9x^3 - 3x^4 + 6$

↙ down ↘ down

60) Describe the end behavior of the function $f(x) = 7x^4 + 2x^2 + 3x - 1$

↖ up ↗ up